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(19)

(54) A PLANT FOR THE THERMONUCLEAR FUSION OF DEUTERIUM OBTAINED FROM SEA WATER

(71) I, ARTHUR PAUL PEDRICK, a British subject, of 77 Hillfield Road, Selsey, Sussex, do hereby declare the invention, for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with a plant for obtaining electricity directly from deuterium centrifuged or obtained in some manner from sea water.

It is ridiculous for politicians, or such people, to talk about a "World Energy Shortage", so long as there are considerable quantities of deuterium and tritium stored away in the thermo-nuclear weapons of various countries, more particularly in the arsenals of the "Superpowers" in the USA and USSR, provided that some means such as described in UK patents nos 1,207,689 and 1,282,391 can be constructed whereby a deuterium-tritium fusion reaction can be initiated, in a controlled manner, and the plasma flow generated thereby used to interact with a magnetic field to produce electricity.

Assuming, however, that some arrangement such as an Automatic Response Nuclear Deterrent System or "A.R.NDS system" as described in UK patent no. 1,361,962, can be established which will give sufficient inter-nation trust to encourage them to remove deuterium and tritium from H bombs for peaceful use, it is at least conceivable that all such deuterium and tritium might eventually be used up, and there is presented the problem of how to initiate a fusion reaction between bits of deuterium alone, which, due the small fraction of which is present in all sea water, is well known to be an almost inexhaustible source of energy.

It is well known that unfortunately, the nuclear fusion of two bits of deuterium alone requires extremely high temperatures, of the order of 400 million deg C, as compared to the temperatures of less than 100 million deg C, required for deuterium-tritium.

It is confidently believed, however, that such very great temperatures, of around 400 million deg C, might be obtained by the arrangement of imploding high speed bullets as described in UK patents Nos. 1,337,936 and 1,366,285 but in which the concave deuterium-tritium pellet implanted noses are replaced by high polish parabolic mirrors, so that as the bullets are about to impact, powerful laser pulses can be focussed to a concentrated point which coincides with the like of a stream of droplets of deuterium in liquid form carried up in a stream of some inert gas.

In the accompanying drawings . . .

Figures 1 and 1*a* show, schematically, the manner in which, it is proposed, to focus laser beam pulses on a central stream of droplets of deuterium.

Figure 2 shows a schematic, elevational, view of a form of furnace, or pressure shell, within which such nuclear fusion of deuterium alone might be initiated *and*

Figure 3 shows a schematic view of a complete plant for the generation of electricity, by plasma modulation from the energy obtained by the nuclear fusion of deuterium only as might be obtained from sea water by centrifuging.

Figures 1 and 1*a* of the drawings show how it is confidently believed, the around 400 million degrees required for the nuclear fusion of deuterium — deuterium might be obtained.

Bullet *B* projected at high speed by discharge from gun barrels by TNT high explosive charge, as described in UK patent no 1,207,698, do not have deuterium and tritium pellets in their nose faces but, instead, have concave parabolic mirror recesses.

As the bullets are about to implode upon one another at the centre line of a pressure shell, or fusion chamber, high power laser pulses *L* are directed at the imploding

bullets at the precise instant that the foci of the parabolic faces on the bullets coincides with the axis of the pressure shell.

It can thus be understood how, as indicated in figure 1*a*, there may be applied to minute droplets of deuterium carried up in a stream of inert gas, such as argon or neon, an intense degree of radiant energy as the radiation reflected from the nose mirrors on the bullets is focussed on the droplets of deuterium. This radiant energy will then be further concentrated as the bullets implode upon one another.

Figure 2 shows a schematic view of a suitable fusion chamber, as a vertical cross-section, at the centre of which the bullets are to implode. The thick pressure shell 3 which has to have apertures for the laser beams and gun bullets, is surrounded by a jacket for cooling water 5 and has entry pipes, at the base, for the flow of inert gas 2 and the droplets 1 of deuterium carried up thereby.

Figure 3 show a schematic view of a complete deuterium-deuterium fusion plant using the method as proposed in figures 1 and 2.

Plasma leaving the fusion chamber is modulated in cross sectional area by an electomagnetic coil 11 linked to a transformer as described in UK patent no 1,207,698, the modulated flow of plasma 12 thus producing an alternating electromagnetic field in a main electromagnetic-coil linked to the transformer, which has an output coil, taking an output of alternating electricity to the grid system indicated, on the left, by a pylon.

The flow of cooling water 5 round the fusion chamber is also passed through the transformer coils to cool these also. Above the top of the electromagnetic coils, the heat still in the plasma flow 13 is used to generate steam 6 from the cooling water flow which is branched off to the right and made to drive a turbine 7 before the steam passes through a condenser 8 and the condensate is returned to the base of the fusion chamber.

The turbine is made to drive a generator which produces sufficient electricity to drive the condensate pump 9 for circulating the cooling water through return pipe 10 and also pumps for the inert gas stream and the injection of the fine stream of droplets of deuterium.

It is hoped that once the deuterium has been initially fused by a firing of the bullets and laser beams, if the tiny droplets of deuterium are injected with sufficient frequency, the fusion reaction will be self-sustaining and not require a second firing of the bullets *B*.

Preferably, as indicated for the plant in figure 3, the plasma flow is branched off as at 14 at the top for helium separation by directing the flow at suitable membranes, 15, and from the spaces above these, 16, passed by pipes 17 to a helium concentrator 20 where it is passed through other membranes 19 and 21 before being pumped out, through pipe 23, for storage.

It will thus be understood that the plant described in figure 3 represents a complete self-contained unit capable of generating its own power supplies, through its turbo-generator, and capable of producing electricity directly from the fusion of minute droplets of deuterium carried up in a stream of an inert gas.

The whole feasibility of the plant depends upon whether the very great temperatures required for deuterium-deuterium fusion can be generated, in the manner predicted, using bullets with parabolic mirror noses, which will focus the laser beams on the minute deuterium droplets. I predict that this will be possible taking account of the fact that there may be very many odd numbers of bullets and laser beams, instead of the 3 only shown for clarity in figure 1.

The plant in figure 3 has at least the "possibility" of generating electricity from deuterium centrifuged from sea water and such electricity could be used, by electrolysis of the same sea water, to produce copious supplies of hydrogen which can be used as a fuel for automobiles, or aircraft. Therefore the plant, in figure 3 could be used to meet, in theory, all foreseeable energy requirements of "civilisation", but I wont live to know if I am right. "Tell me, tell me," like Leonardo da Vinci wrote in his note books *"If anything was ever done"?*

WHAT I CLAIM IS:—

1. A plant for the thermo-nuclear fusion in a controlled manner of deuterium obtained from sea water, the plant producing electricity by modulation of the flow of plasma in the field of an electromagnetic coil, characterised by means for projecting in a stream of inert gas, such as argon or neon, a flow of droplets of deuterium up the centre line of a pressure shell, or fusion chamber, means for projecting simultaneously three or a greater odd number of bullets by high explosive at the droplets of deuterium, the bullets having concave nose profiles formed by parabolic mirror surfaces and means for projecting, in the opposite sense to the line of movement of each bullet, powerful laser beam pulses, the projection of the laser beam pulses being delayed until the bullets are at such a distance from the centre line of the fusion chamber that the laser beam pulses reflected off the concave parabolic noses of the bullets, are concentrated at the foci of the parabolic mirrors, which also coincide with the droplets of deuterium,

which thus receive very concentrated radiant energy.

2. A plant, as in claim 1, wherein the plasma flow, from the presumed deuterium — deuterium fusion, is modulated change in flow cross sectional area, by a constricting magnetic field, the current for which is derived, in alternating form, from a transformer, which has a main coil in which an EMF is produced by the modulated plasma flow, and an out-put coil for connection to an electricity grid system, as described in UK patent no 1,207,698.

3. A plant, as in claim 2, wherein the plasma flow tube and the transformer coils are provided with a cooling water system, such cooling water after passage past the plasma modulating and main coils, being heated by the heat still present in the plasma flow to change it into steam, which is used to drive a turbine coupled to a generator, the generator producing electricity, which drives pumps which maintain the circulation of the cooling water after passage through a condenser unit, and which drives also pumps for the flow of inert gas and deuterium droplets.

4. A plant, as in claim 3, including means for separating helium out of the flow of plasma created by the deuterium fusion.

5. A plant for the thermo-nuclear fusion, in a controlled manner, of deuterium obtained from sea water, and the use of the plasma flow to produce electricity as claimed in claim 1 and substantially as described with reference to figures 1 to 3 of the accompanying drawings.

A. P. PEDRICK.

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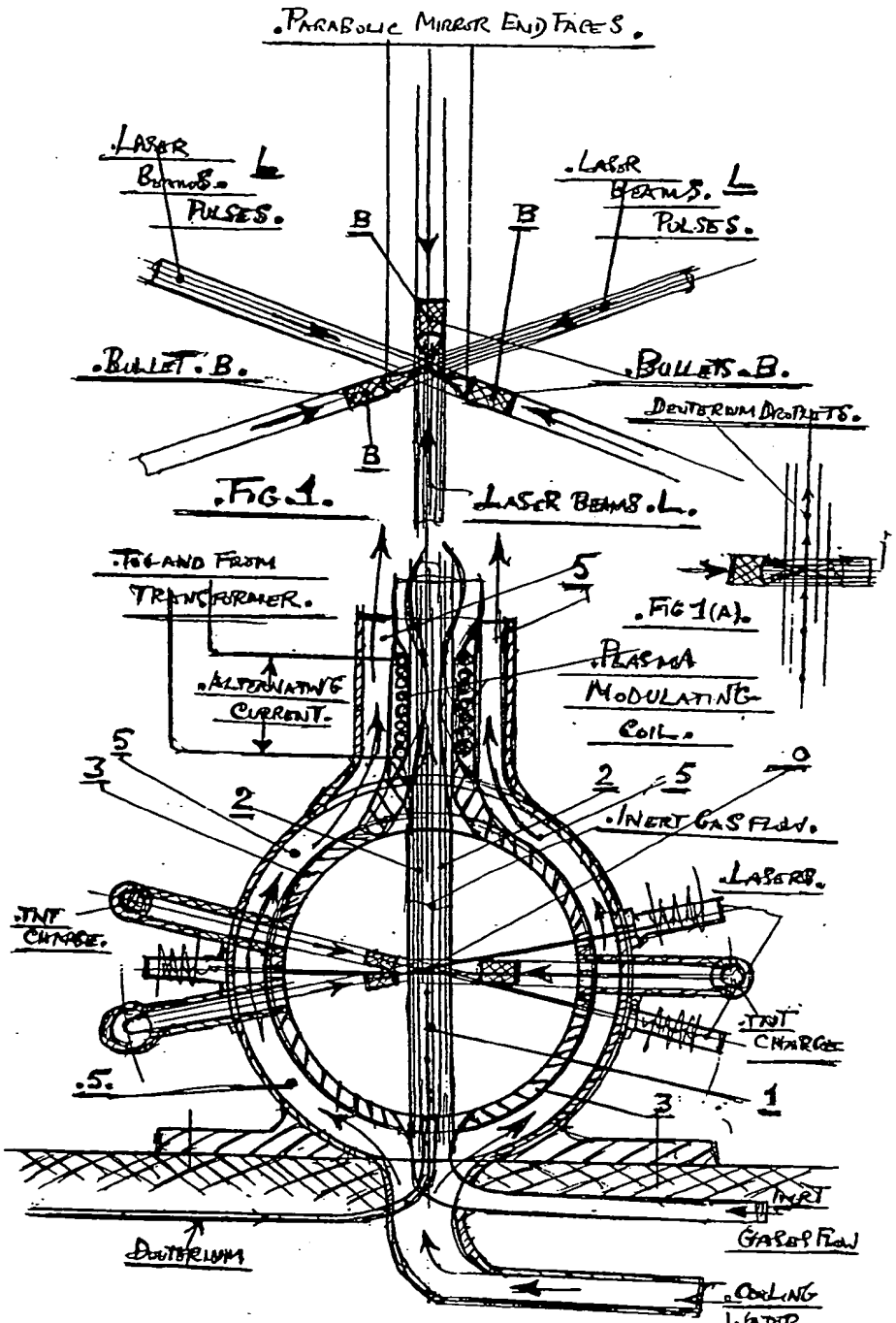
.PARABOLIC MIRROR END FACES.
.LASER BEAMS. L PULSES.
.LASER BEAMS. L PULSES.
B
B
B
.BULLET. B.
.BULLETS. B.
DEUTERIUM PELLETS.
.FIG.1.
LASER BEAMS. L.
.TO AND FROM TRANSFORMER.
.ALTERNATING CURRENT.
5
.FIG 1(A).
.PLASMA MODULATING COIL.
5
3
2
2
5
0
.INERT GAS FLOW.
.LASER B.
.TNT CHARGE.
.TNT CHARGE
.5.
3
1
INERT GASES FLOW
DEUTERIUM
.COOLING WATER.
.FIG.2.

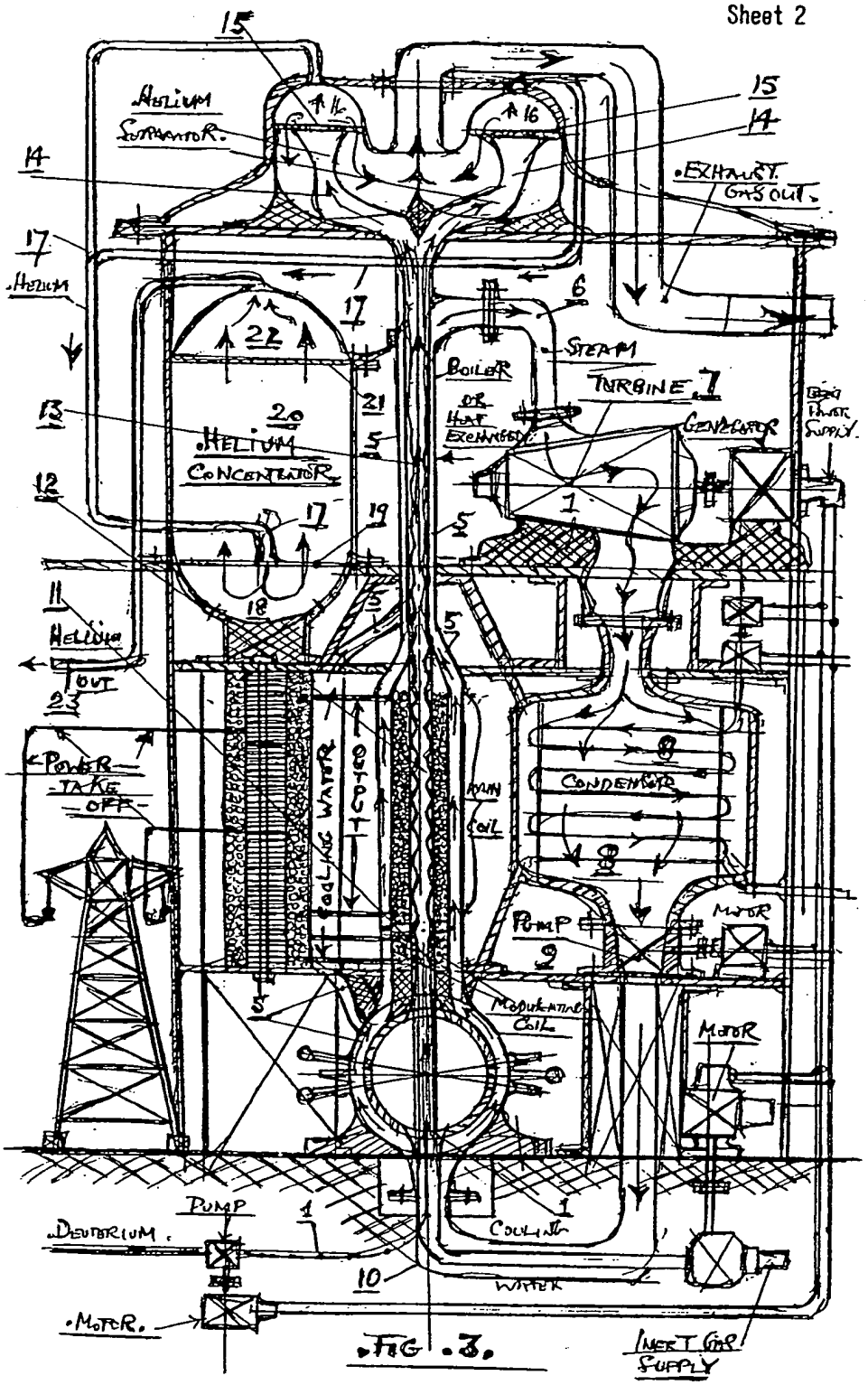
HELIUM SEPARATOR
EXHAUST GAS OUT
HELIUM
STEAM
BOILER OR HEAT EXCHANGER
TURBINE
GENERATOR
HELIUM CONCENTRATOR
HELIUM OUT
POWER TAKE OFF
LEADING WATER
OUTPUT
MAIN COIL
CONDENSER
PUMP
MOTOR
MODERATING COIL
COOLING WATER
DEUTERIUM
INERT GAS SUPPLY

FIG. 3.

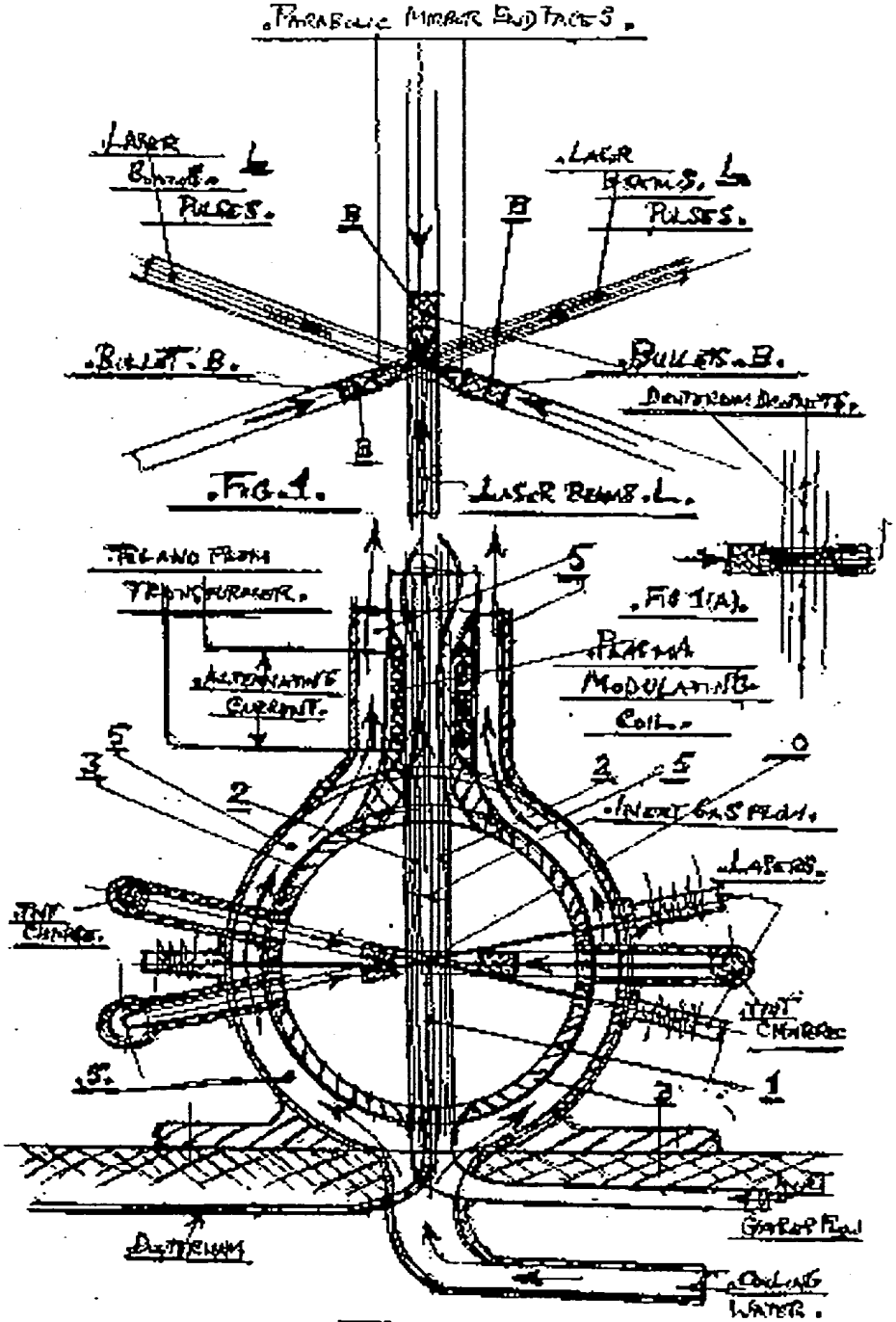
PARABOLIC MIRROR END FACES.
LASER BEAMS. PULSES.
LASER BEAMS. PULSES.
B
B
RELIEF B.
PULSES B.
B
LASER BEAMS L.
FIG. 1.
FIELDING FROM TRANSFORMER.
ALTERNATING CURRENT.
5
FIG 1(A).
PLASMA MODULATING COIL.
5
3
2
2
5
0
INERT GAS FEED.
LASERS.
TNT CHARGE.
TNT CHARGE.
5.
2
1
DEUTERIUM
COOLING WATER.

FIG. 2.

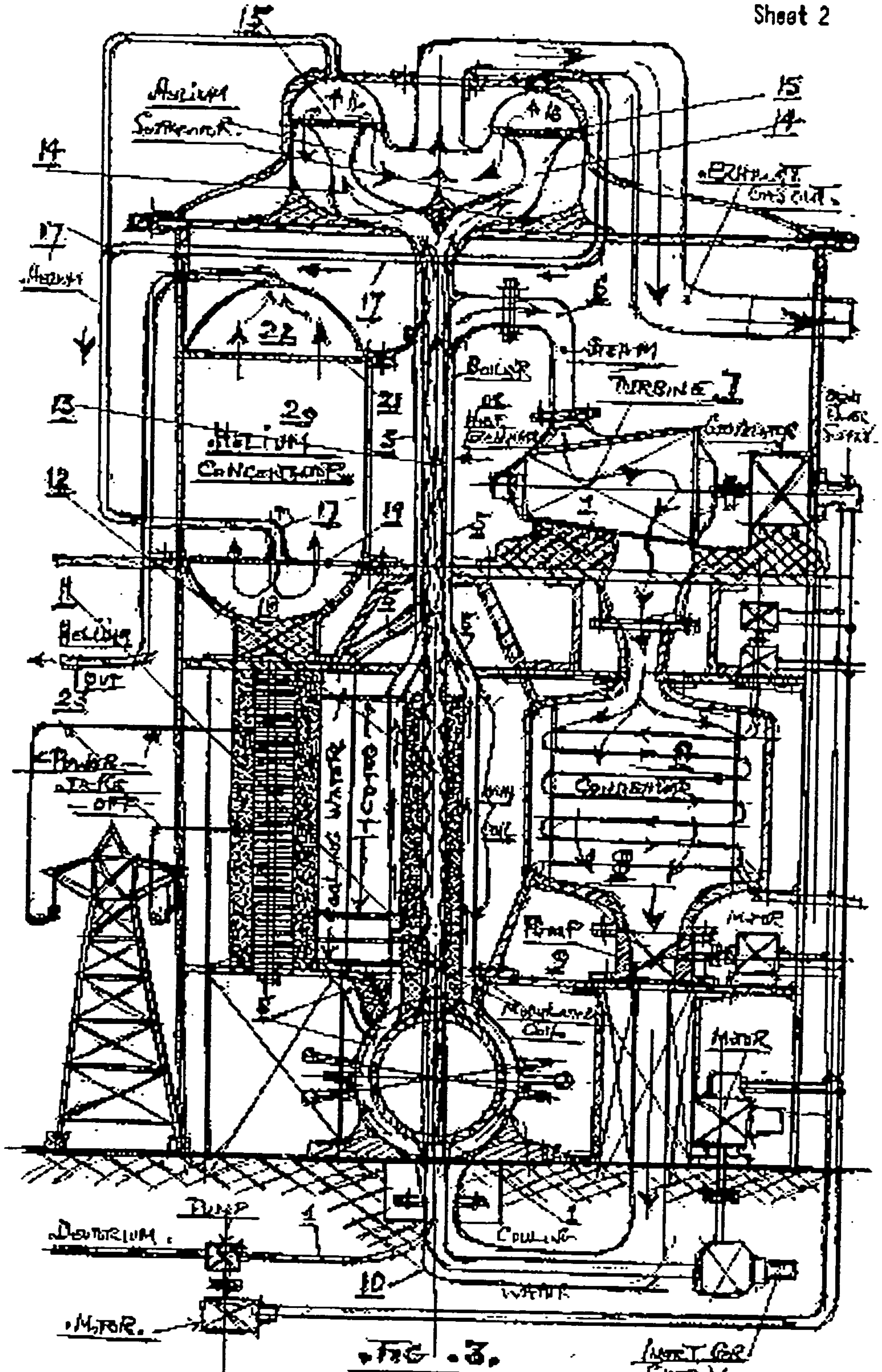

FIG. 3.